



Rocky Flats Office

Comprehensive Treatment and Management Plan

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ACRONYMS AND INITIALISMS

ADL	Above the Detection Limit
AEA	Atomic Energy Act
CAI	Controlled Air Incinerator
CDH	Colorado Department of Health
CFR	Code of Federal Regulations
D&D	Decontamination and Decommission
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ECM	Electrochemical Milling
EDL	Economic Discard Limit
EPA	U.S. Environmental Protection Agency
EIS	Environmental Impact Statement
FBU	Fluidized Bed Unit
FFCA	Federal Facilities Compliance Agreement
HAZWRAP	Hazardous Waste Remedial Actions Program
HSWA	Hazardous and Solid Waste Amendments to RCRA
LDR	Land Disposal Restrictions
LLM	Low Level and Hazardous Mixed Waste
LLW	Low Level Waste (radioactive below 100 nCi/g)
MWTP	Mixed Waste Treatment Project
NEPA	National Environmental Protection Agency
NTS	Nevada Test Site
PCB	Polychlorinated Biphenyl
RCRA	Resource Conservation and Recovery Act

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RFP	Rocky Flats Plant
RMW	Radioactive Mixed Waste
RTR	Real Time Radiography
TCLP	Toxic Characteristics Leaching Procedure
TRM	Transuranic and Hazardous Mixed Waste
TRU	Transuranic Wastes (radioactivity greater than 100 nCi/g)
VOC	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant (New Mexico)

DEFINITIONS

Baseline -	The current set of technologies proposed to address the LDR mixed waste problem.
Characterization -	Description of the properties or attributes of an item, process, or service.
LDR -	Land Disposal Restriction requirements for those waste restricted from land disposal and required by 40 CFR 168 and 6 CCR 1007, Part 268
Low Level Wastes -	Wastes containing less than 100 nCi/gram activity from transuranic elements.
Mixed Residue -	Actinide bearing materials which historically contained recoverable quantities of plutonium and RCRA controlled constituents or exhibit hazardous characteristics.
Mixed Wastes -	Actinide bearing material which historically contained non-recoverable quantities of plutonium and RCRA controlled constituents or exhibit hazardous characteristics.
Transuranic Element -	Those radioactive materials with atomic number greater than Uranium (92).
Transuranic (TRU) Waste -	Wastes containing greater than or equal to 100 nCi/gram activity from transuranic elements.

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1. INTRODUCTION

Rocky Flats Plant (RFP) was designed and built as a manufacturing facility for the production of nuclear weapons components. As a manufacturing facility, RFP generates waste as a by-product of the various processes involved. Because of the materials associated with the fabrication and processing of weapons components, the waste that has been generated creates unique problems not related to industrial waste.

For over 40 years, RFP has generated about 62 forms of radioactive waste that are believed to be land disposal restricted (LDR), and therefore fall under the provisions of the Resource Conservation and Recovery Act (RCRA). About 11,260 yd³ and 28,965 gal. of this waste are low level mixed (LLM) wastes. An additional 1,155 yd³ are transuranic mixed wastes (TRM). Most of these wastes have been in storage for longer than 1 year and are, therefore, in violation of RCRA. The major categories of these wastes are indicated in Figure 1-1.

Initially, the Atomic Energy Act (AEA) permitted the Department of Energy (DOE) to dispose of low level radioactive waste (LLW) by depositing the waste into landfills designed and regulated by DOE. However, RCRA necessitated changes to this policy. Therefore, DOE issued an interpretive ruling May 1, 1987 that conceded the jurisdiction of RCRA over the hazardous components of mixed wastes. As a result of this ruling, the previously permitted disposal of mixed waste into regulated landfills was halted. Most DOE facilities now store mixed wastes on-site, pending approval of disposal facilities that can accept hazardous waste under RCRA.

On May 10, 1991, the Environmental Protection Agency (EPA) and DOE agreed to a 2 year extension of a Federal Facilities Compliance Agreement (FFCA). Among the issues agreed to was one requiring a Comprehensive Treatment and Management Plan (CTMP) for LDR wastes generated by and stored at RFP. This plan is to be submitted to the EPA June 10, 1992. In order to understand the need for this plan, a discussion of some of the events leading up to this agreement is appropriate.

In addition to the currently stored wastes and wastes generated in a production standby mode, several new types of LDR wastes are expected to be generated at RFP through activities related to environmental monitoring and restoration, residue processing, analytical characterization, and plant decontamination and decommissioning activities. Current figures, predicated on a standby production role for RFP, indicate that the LLM production type wastes will continue to be generated at a rate of about 324 yd³/yr. New sources of wastes generation are estimated to produce an additional 3,600 yd³/yr of LLM. TRM waste generation is expected to increase to a rate of 365 yd³/yr. This new generation of wastes presents a critical problem for RFP. The current permitted storage capacity for TRM waste is 1,601 yd³. As of February 23, 1992, 1122.7 yd³ were stored in 16 RCRA permitted on-site storage areas. At current generation rates, TRM will reach the currently permitted capacity in 1992.

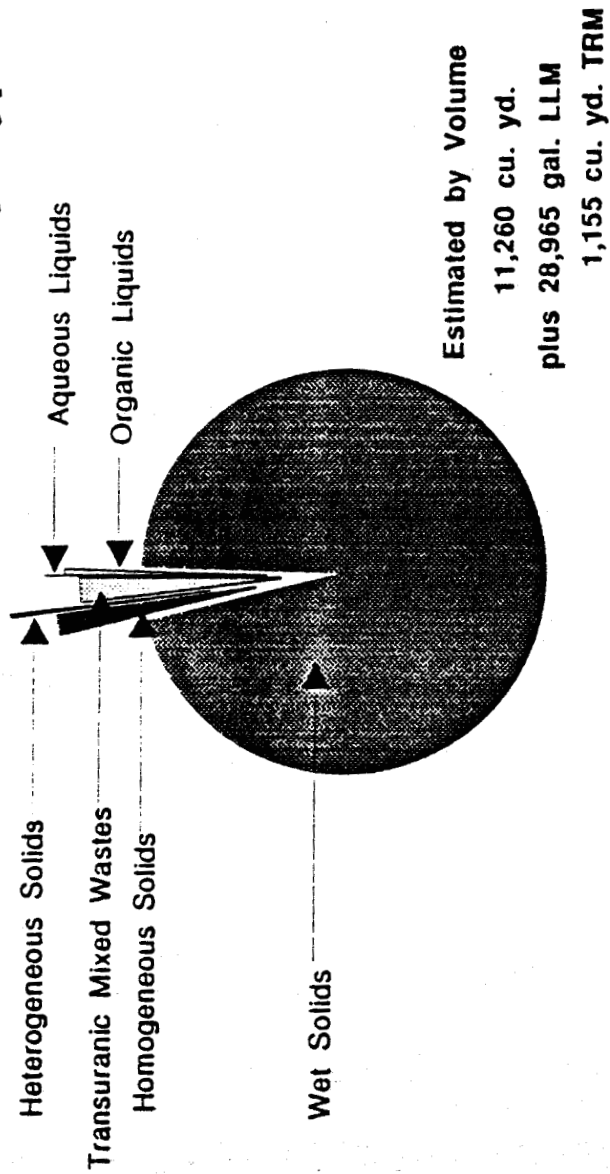
The FFCA that was initially prepared September 19, 1989 by the EPA, the State of Colorado, and DOE provided a 1 year period for DOE to comply with land disposal restrictions. This agreement specifically addressed "prohibited wastes," that is, those subject to land disposal storage prohibitions as of September 19, 1989. This FFCA does not address any RCRA compliance issues other than LDR wastes.

Under the terms of the FFCA, the EPA required eleven reports from DOE during the course of the year. Among those reports were Treatment Plans Nos. 1 and 2, which identified technologies and schedules that DOE plans to use to bring the prohibited wastes into compliance with storage prohibitions. This is the FFCA that was extended May 10, 1991. The extension has been informally designated FFCA II.

The EPA submitted comments on Treatment Plans Nos. 1 and 2 to DOE on June 10, 1991. These comments essentially rejected some provisions of the treatment plans and initiated the effort to develop the CTMP. The CTMP specifies the five primary milestones to be accomplished for each treatment technology and the dates for the accomplishment of each. These milestones are as follows:

- submission of the Treatability Study Exemptions
- submission of the R&D Permit application
- submission of Part B Permit Application Modification
- initiation of Systems Operation Testing on production systems
- submission of a Waste Processing Schedule.

Figure 1-1 Mixed Waste Breakdown By Type



2. OBJECTIVE

The CTMP is a legal document with the following objectives:

- Identify the specific LDR wastes at RFP that are covered in FFCA II
- State how those wastes will be brought into compliance
- Develop the milestones for those wastes that required treatment.

3. ACHIEVEMENT OF COMPLIANCE

Most of the wastes at RFP have been in storage for 1 year or longer. RCRA specifically prohibits storage of wastes containing untreated hazardous constituents for longer than 1 year. These are the provisions of 40 CFR 268.50 that led DOE to seek the FFCA with EPA, so DOE could continue to operate the facility while bringing these waste forms into compliance with RCRA regulations.

Because of the strategy DOE has adopted for achieving compliance, the actions that constitute compliance are different for LLM wastes and TRM wastes. For each waste category, the following constitutes compliance:

- LLM wastes identified as LDR must be either adequately characterized or treated to prove that hazardous constituents in these wastes are below treatment standards
- TRM wastes must be treated to meet the Waste Isolation Pilot Plant (WIPP) waste acceptance criteria (WAC), assuming that the no-migration exemption for WIPP remains valid. When this facility opens in 1998 it will accept TRM wastes that have not been treated to meet RCRA treatment standards for hazardous constituents. All wastes going to WIPP will only need to meet minimum transportation requirements and facility-specific WAC before shipment.

Assumptions for Developing the Baseline Plan

This plan is based on several assumptions. If an assumption changes, the plan will require reevaluation and possibly modification. The key assumptions are:

- Federal, State and local regulations. Operations for removing mixed LDR wastes must comply with current regulations.
 - Relevant WAC, transportation and shipping regulations, and DOE requirements will not significantly change between the development of the plan and its implementation.
 - All relevant Federal, State and local government requirements for RFP operations will not significantly change.
- DOE orders and requirements. Various DOE orders and requirements for operation of facilities, administration of capital projects, safety, compliance, materials handling and management, and contractual obligations must be interpreted and appropriately applied.
 - The facility seismic and other requirements for operating a radioactive waste treatment facility may be less stringent than for making plutonium components; however, until these requirements are defined, requirements of DOE 6430.1B are assumed to apply.
- Plutonium and Other Radioactive Materials Policy. The DOE strategy regarding management of plutonium and other radioactive materials is evolving as national policy changes. While current defense uses are being reduced, plutonium will continue to be retained as a future reserve.
 - Neither plutonium nor other radioactive materials are subject to state regulation.

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- Product and waste disposition. WIPP is the only potential location for disposal of transuranic (TRU) wastes. The Nevada Test Site (NTS) is the only potential location for disposal of LLW.
 - WIPP will begin receiving TRM in December 1998.
 - The WIPP no-migration variance will remain in its current, unaltered state during the 5-year test period for WIPP; thereafter, an equivalent variance will be granted.
 - NTS will begin accepting LLM wastes in FY1995.
 - All U. S. Department of Transportation (DOT) requirements will be met for shipping wastes to other facilities, and these requirements will not substantially change.
- The Rate of Shipment. The rate of shipment of waste to a treatment or disposal site has many variables, including the number of specialized approved carrier vehicles available, and the number of trips permitted on state highways.
 - Adequate vehicles and TRUPACT II containers will be available to support TRU shipping plans.
 - Approvals for transporting waste to the selected disposal sites will be obtained.
- Sampling and Characterization. This plan depends upon methods for sampling and analyzing LLM and TRM wastes.
 - EPA protocols appropriate for hazardous wastes sampling, characterization, sample handling, time limitations, and data standards also apply to LLM wastes.
 - Preproduction scale testing may be required for some mixed waste forms using actual radioactive mixed wastes before the full scale treatment system can be designed. These small-scale treatment systems cannot be designed until the waste is adequately characterized so that design criteria and safety standards for the facilities can be selected.
 - DOE will continue to allow commercial analytical characterization of mixed waste forms. Adequate capability for sampling and characterization will exist.
- Permitting. Certain portions of treatment units will require appropriate permitting.
 - The time required to obtain permits from regulatory agencies will not substantially differ from the time required to obtain permits now.
 - Permits currently at RFP will not undergo substantial revision or reinterpretation.
- National Environmental Protection Agency (NEPA) documentation. The project described in this plan will require NEPA documentation to be completed and approved.
 - Categorical exclusions that are being developed now may reduce the NEPA documentation required for some bench and pilot-scale treatment of mixed wastes; however, the enclosed schedules reflect the current NEPA requirements.

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- The NEPA process relating to storage, treatment, construction for processing, packaging, and handling of mixed residues, and any related litigation will be completed according to proposed schedules.
- The Record of Decision will not be extensively challenged in court; any litigation related to mixed residue removal plans will not affect proposed schedules.
- An Environmental Impact Statement (EIS) will be required for implementing any incineration technology proposed by this plan.
- Project Funding. The projects described in this plan will require sufficient congressional authorization and appropriation for capital equipment, operation, and construction.
 - Congress will annually authorize and appropriate funds for the design and production of facilities for processing, packaging, and handling of mixed waste.
 - Congressional funding requirements for authorization of capital items costing \$1.2 million and more will continue unchanged.
 - The estimates of cost of treatment facilities and required building modifications used adequately to develop this plan will determine which treatment systems require congressional line item funding.
 - Project schedules are consistent with resources available to DOE as stated in the DOE Environmental Management 5-Year Plan.
 - Congress will continue to provide funds to maintain the RFP infrastructure in spite of the change in mission.
 - Assume a 10% per annum increase in the EM budget for FFCA compliance over the next 5 years.
- Storage Space. Processing the mixed wastes will require additional compliant storage areas.
 - New construction must meet applicable standards of safeguards and security, design criteria, and design basis accidents.
 - If a new mixed waste storage building is needed, it will be built on-site. Permits will be required.
 - Colorado Department of Health (CDH) will grant the appropriate permits.
 - Permitted waste storage capacity will become available, and current limits will be negotiable.
- Treatment Systems. The best technology option, based on such considerations as technical feasibility, economics, and safety will determine the method of treatment for mixed waste forms.
 - All technologies will be completely proven or developed to the EPA definition of "commercial" treatment for hazardous waste before a decision can be made to implement all of the technologies for mixed waste treatment.

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- Incineration is a viable technology for treatment of radioactive mixed wastes, and RFP can design, build, and permit an incineration facility if it is the best technology option.
- Wastes covered by the FFCA. This plan is being developed as new regulations are promulgated regarding the hazardous constituents of mixed wastes.
 - "Thirds" wastes are included in this plan because the rules governing these wastes will be promulgated before this plan will be fully implemented.
 - Future mixed LDR waste generated at RFP will be covered in the FFCA.
 - As new mixed LDR waste forms are generated, the CTMP will be modified, as appropriate, under the Annual Progress Report required by the FFCA.
- 7,890 yd³ of LDR mixed waste will be generated from 1995 to 2009, based on adoption of the "Actinide Separation" option from the *Mixed Residue Reduction Report*.
- The DOE Waste Management Programmatic Environmental Impact Statement.
 - This plan assumes the Programmatic Alternative of treatment of mixed waste at the waste generation facility is adopted. This option would minimize the shipment of untreated waste through the DOE complex.
- The capacity of the treatment facilities will be designed to reduce the backlog and process further generation of waste within 10 years.
- The current permitted storage capacity for TRM waste will not remain in effect, and sufficient physical space will be available for LDR waste storage.
- LDR LLM wastes will not be supercompacted.
- Based on best current information, off-site RCRA treatment at other DOE facilities or commercial facilities will not be available.
- New "debris" rules will most likely impact the plan, but will have no effect on the current baseline approach.
- Capability and capacity for characterization (including sampling and analysis) will be available either at RFP, other DOE sites, or within the commercial sector to meet the requirements stated in Figure 7.1.

4. STRATEGY FOR ACHIEVING OBJECTIVES

Figure 4-1 shows the paths for achieving compliance. The following is a discussion of the options available for bringing wastes into compliance with the storage prohibitions:

- Path A: Collect analytical data of the mixed wastes to show that some RFP mixed wastes already meet the LDR treatment standards of 40 CFR 268.41 and 268.43 and do not require further treatment under RCRA. Figure 4-2 identifies wastes that are likely to have a portion of their stored volume brought into compliance by analytical characterization of the waste form.
- Path B: Ship the mixed wastes to other DOE facilities or to commercial facilities for treatment to meet the standards found in 40 CFR 268.41 and 40 CFR 268.43, using technologies recommended in 40 CFR 268.42 or through the process of demonstrating an equivalent method variance as specified in 40 CFR 268.42(b). This method is now closed to RFP due to restrictions in current waste acceptance. DOE will continue to pursue this option as appropriate.
- Path C: Treat the mixed wastes at RFP to treatment standards for hazardous wastes found in 40 CFR 268.41 and 268.43 by using technologies recommended in 40 CFR 268.42 or through the process of demonstrating an equivalent method variance as provided in 40 CFR 268.42(b).
 - Figure 4-3 is a schematic diagram illustrating the baseline technologies selected for treatment of the types of LLM wastes at RFP. This treatment scheme is a specific implementation of the DOE Mixed Waste Treatment Project (MWTP) and is consistent with the overall DOE national strategy for achieving compliance with these waste forms.
 - Figure 4-4 uses shading behind portions of this flow diagram to identify the treatment systems required for these wastes. A time phased approach to bringing these integrated facilities into operation comprises the baseline plan for bringing these wastes into compliance.
 - Figure 4-5 shows the non-thermal treatment which is an alternative to the baseline FBU system.
 - Figure 4-6 identifies the LLM waste forms that would be treated by each system.
 - The schematic diagrams in Figures 4-3 and 4-4 represent the baseline plan. The limited waste characterization data and treatment technology capability assessment information available for the selection process are uncertainties that can be managed. Alternatives to the baseline plan are, and will continue to be, developed and funded by DOE.
- Path C - alternate: Treatment of mixed wastes at RFP to standards set through a treatability variance process as specified in 40 CFR 268.44. No wastes are known to require this option at this time.
- Path D: Treatment of mixed wastes at RFP to standards set in "Debris" regulations proposed January 9, 1992 in 57 FR 958. These regulations will be promulgated May 6, 1992. Because the final version of this rule is not available, the applicability of these treatment standards to the RFP wastes has not yet been determined.

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- Path E: Shipment of untreated mixed waste to a facility that has a no-migration exemption in place is prohibited according to the provisions of 40 CFR 268.6. This path is available if the waste does not require treatment to meet waste acceptance criteria.
 - Figure 4-6 identifies the TRM waste forms that may achieve compliance by way of this path. Analytical characterization of the waste forms is key to making this decision.
- Path F: Shipment of untreated mixed waste to a facility that has a no-migration exemption on-site is prohibited according to the provisions of 40 CFR 268.6. This path is available if the waste requires treatment to meet waste acceptance criteria.
 - Figure 4-7 shows the TRM waste forms that may require treatment to pass WIPP WAC. The final determination will require analytical characterization of the waste forms. It should be noted that the bulk of this processing and handling equipment and the facilities is already in place at RFP. These systems include Buildings 774, 374, and 664 as well as a valving and piping infrastructure that serves the whole plant. Only the minimum number of new processes and technologies will be added in order to improve the plant's waste systems enough to handle subject wastes.

Figure 4-1
Pathways to Achieve Compliance

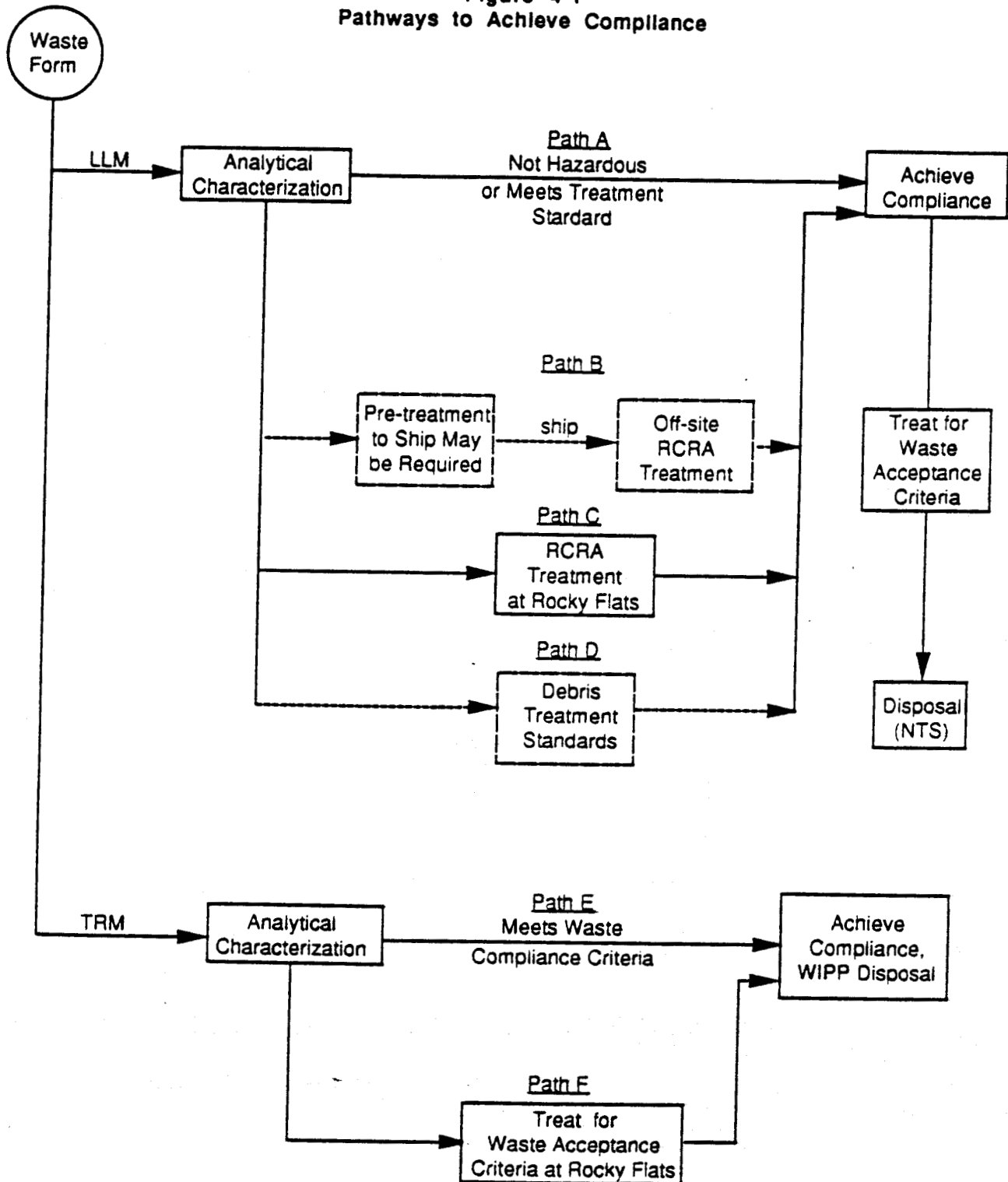
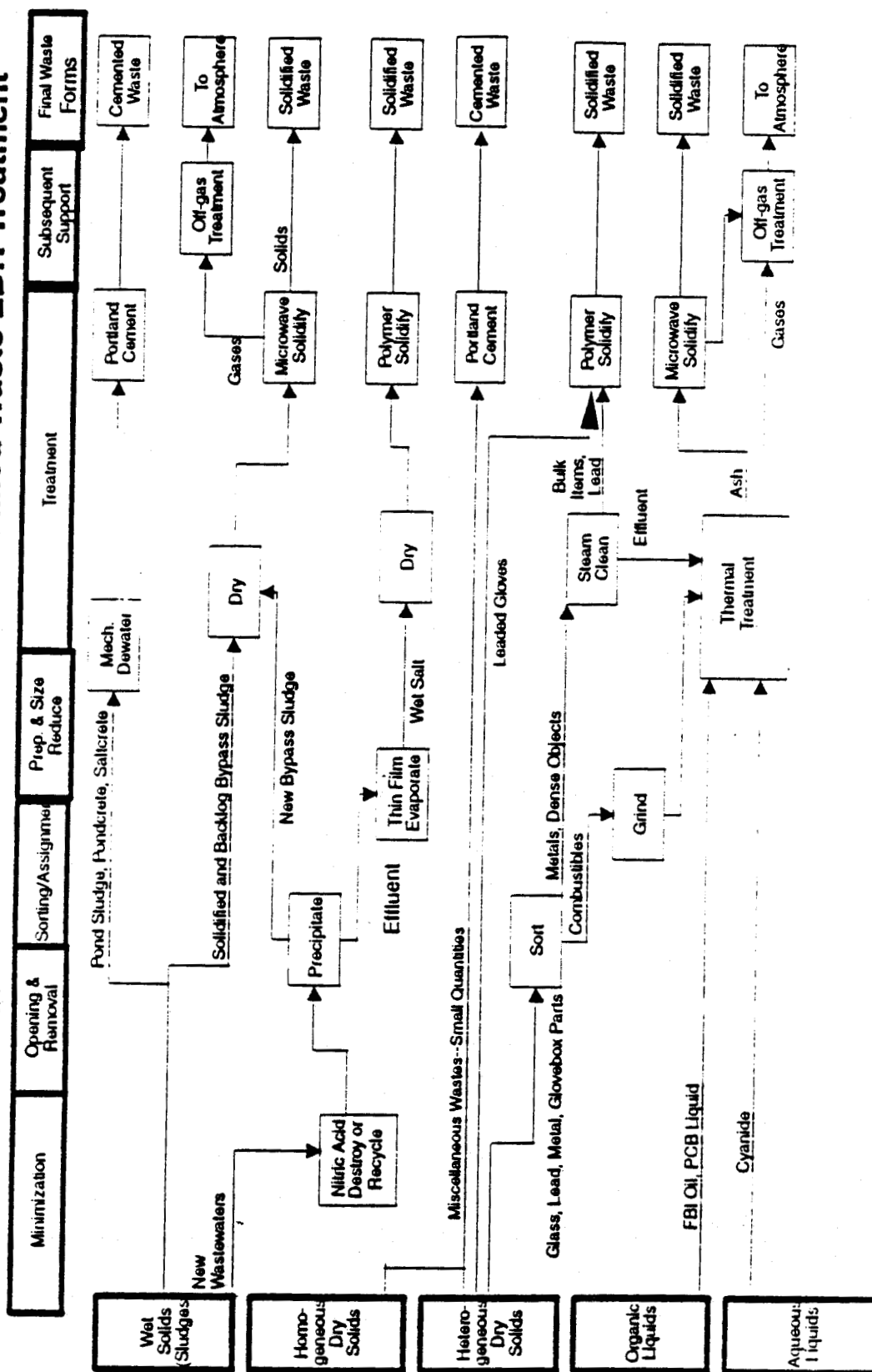


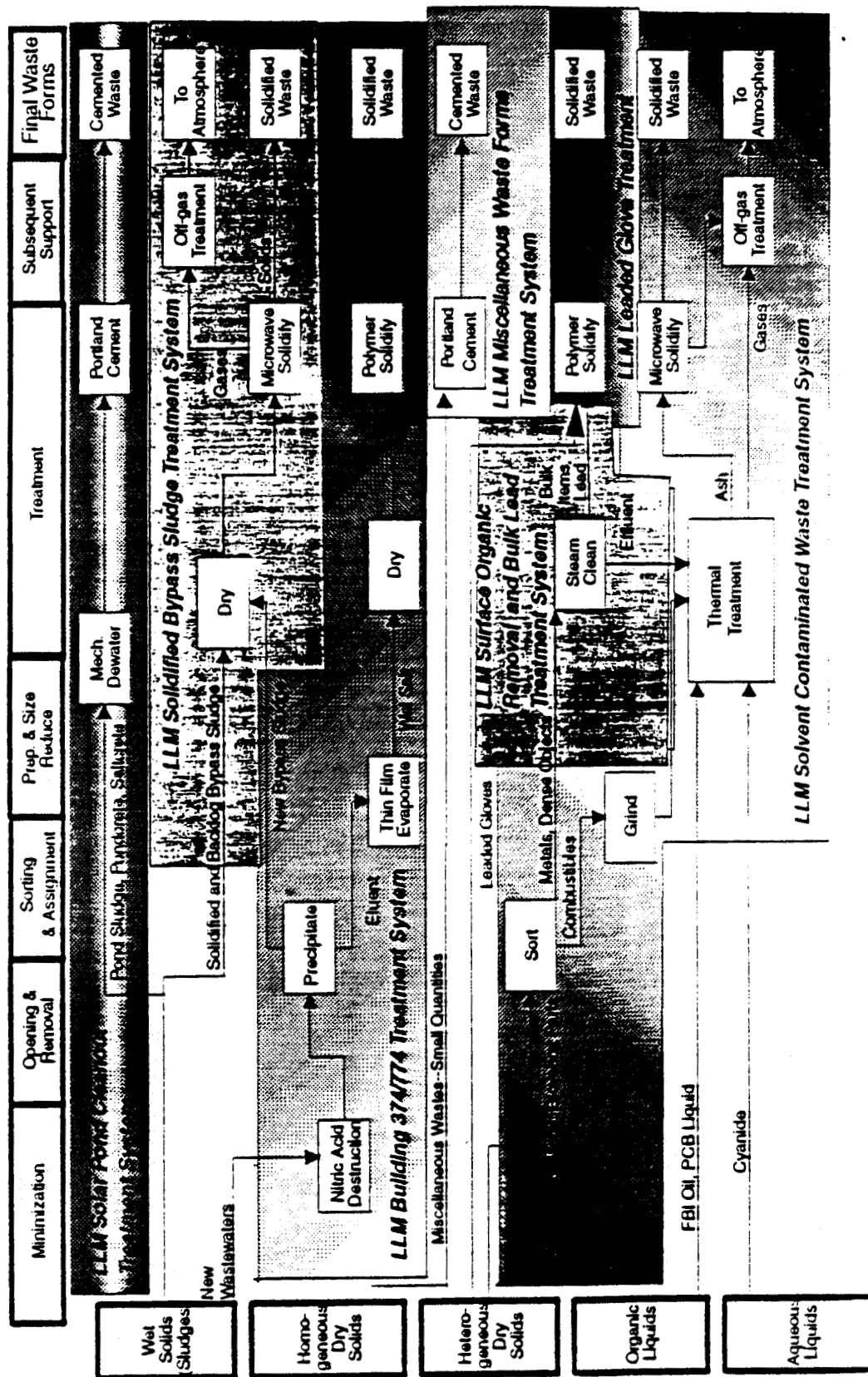
Figure 4-2
LLM WASTE FORMS
PATH A

<u>CATEGORY</u>	<u>VOLUME (yd³)</u>	<u>REASON SELECTED</u>
Saltcrete	2560	Limited Analysis
Solidified Bypass Sludge	589.5	Limited Analysis
Combustibles	417.4	Process Knowledge Only
Cemented Composite Chips	118	Process Knowledge Only
Roaster Oxide	107	Process Knowledge & Limited Analysis
Soil & Debris	57	Process Knowledge Only
Filters	38.1	Process Knowledge Only
Metal	28.1	Process Knowledge Only
FBI Ash	10.9	Process Knowledge Only
Insulation	2.2	Process Knowledge Only
Heavy Metal	1.9	Process Knowledge/LDR for lead/RTR Planned
Absorbed Organics	1.1	Solidified/No Longer Ignitable

Figure 4-3. Technology Areas For RFP Low Level Mixed Waste LDR Treatment



**Figure 4-4. Technology Areas And Systems
For RFP Low Level Mixed Waste LDR Treatment**



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Figure 4-5 Non-Thermal Conceptual Treatment System

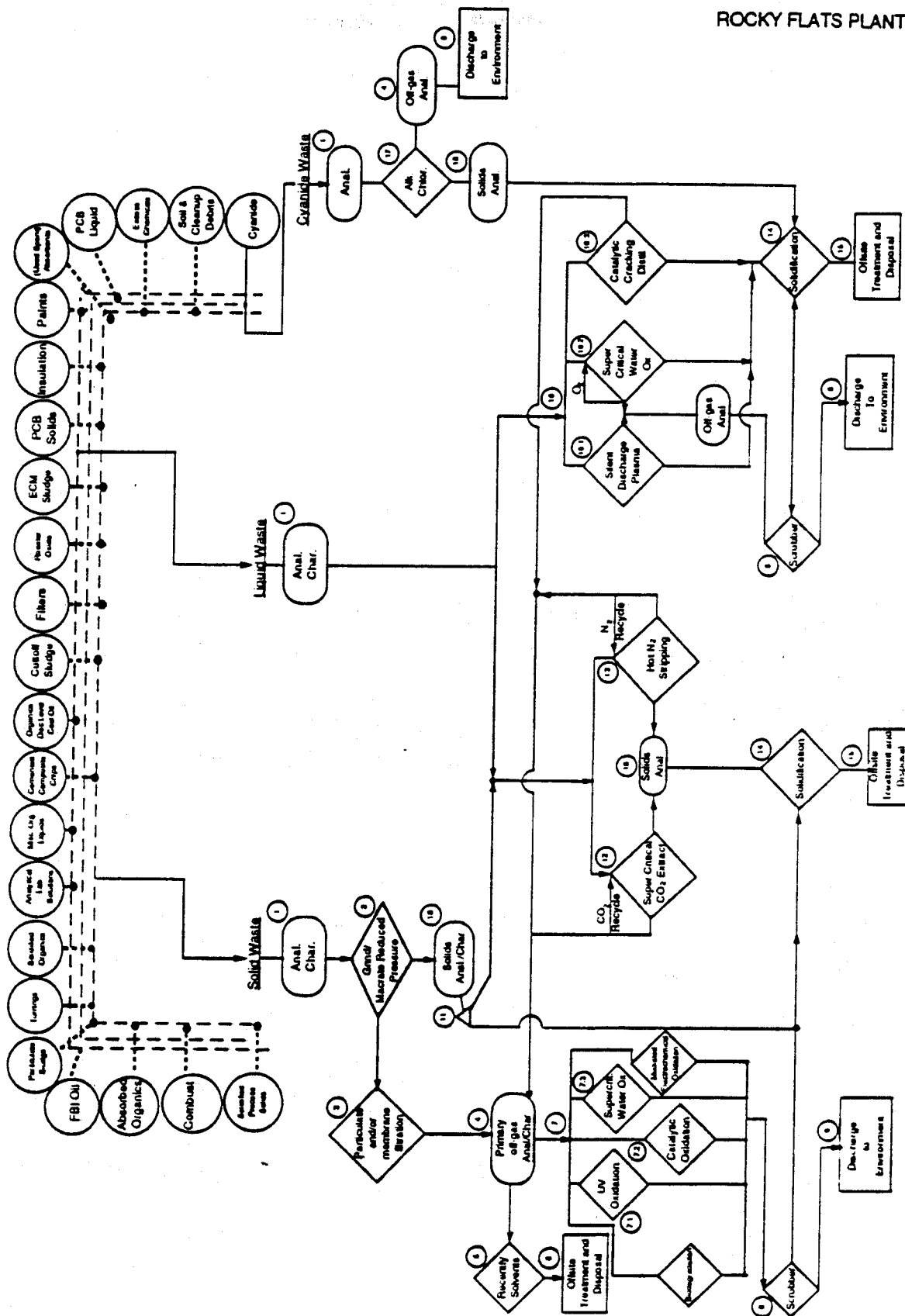


Figure 4-6
PATH C

System	Baseline Technologies	Applicable Waste Forms	National Plan Waste Category (Estimated)
LLM Solvent Contaminated Waste Treatment System	Fluid Bed Unit + Offgas Capture + Microwave Solidification	Absorbed Organics	WS=Wet Solids
	or Non Thermal Treatment System	Analytical Lab Solutions Cemented Composite Chips Cyanide ECM Sludge Excess Chemicals Filters Fluid Bed Incinerator Oils Insulation Misc. Organic Liquid Organics -- Dis. Level Paints Particulate Sludge PCB Liquid PCB Solid Roaster Oxide Soil And Cleanup Debris Solidified Organics Solidified Process Solids Turnings Used (Spent Absorbents)	OL=Organic Liquids HTDS=Heterogeneous Dry Solids AL=Aqueous Liquid WS=Wet Solids AL=Aqueous Liquids WS=Wet Solids OL=Organic Liquids WS=Wet Solids OL=Organic Liquids OL=Organic Liquids OL=Organic Liquids OL=Organic Liquids WS=Wet Solids OL=Organic Liquids WS=Wet Solids WS=Wet Solids WS=Wet Solids WS=Wet Solids WS=Wet Solids WS=Wet Solids WS=Wet Solids WS=Wet Solids
LLM Solar Pond Cleanup Treatment System	Cementation	Pond Sludge	WS=Wet Solids
		Pondcrete Backlog	WS=Wet Solids
		Saltcrete Backlog	WS=Wet Solids
LLM Solidified Bypass Solidification Sludge Treatment	Microwave	Solidified Bypass Sludge	WS=Wet Solids
LLM Miscellaneous Waste Form Treatment System m	Cementation	Acid	AL=Aqueous Liquid
		Beryllium Fines	HTDS=Heterogeneous Dry Solids
		FBI Ash	HTDS=Heterogeneous Dry Solids
		Ground Glass	HTDS=Heterogeneous Dry Solids
		Sand from Button Breakout	HTDS=Heterogeneous Dry Solids
		Silver Nitrate	WS=Wet Solids

Figure 4-6 (continued)
PATH C

System	Baseline Technologies	Applicable Waste Forms	National Plan Waste Category (Estimated)
LLM Surface Organics Removal and Bulk Lead Treatment System	Steam Cleaning + Macroencapsulation (Polymer Solidification)	Glass	HTDS=Heterogeneous Dry Solids
		Metal Lead	HTDS=Heterogeneous Dry Solids HTDS=Heterogeneous Dry Solids
LLM Leaded Gloves Treatment System	Macroencapsulation (Polymer Solidification)	Leaded Gloves	HTDS=Heterogeneous Dry Solids
		Leaded Gloves (Acid Contamination)	HTDS=Heterogeneous Dry Solids
LLM Building 374/774 Treatment System	Thin Film Evap. + Nitrate Destruction + Polymer Solidification + Microwave	Nitrate Salts	
		Bypass Sludge	WS=Wet Solids

Figure 4-7
PATH E

TRM Waste Forms That May Not Require Treatment To Meet WIPP Waste Acceptance Criteria

Combustible Waste
Filter Waste
Glass
Heavy Metal
Leaded Gloves
Leaded Gloves (Acid Contaminated)
Metal
Miscellaneous Waste
Solidified Organics

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**Figure 4-8
PATH F**

Treatment Required To..	Applicable Technology	Waste Forms
Meet WIPP Free Liquid Waste Acceptance Criteria	Cementation	Aqueous Sludge Particulate Sludge Solidified Bypass Sludge Solidified Lab Waste Spent Absorbents
WIPP Does Not Allow Bulk Lead in Its Waste Acceptance Criteria	Steam Cleaning	Decontaminate TRM Lead to LLM Lead
WIPP Does Not Allow Reactive Metals in Its WAC	Melt + Sparge (Cl, O or Air) + Cool	Misc. Pu Recovery By- Products -- Crucibles Misc. Pu Recovery By- Products -- Salts

5. IMPLEMENTATION SCHEDULE

The implementation schedules for each of the eight treatment systems are shown in Figure 5-1. These schedules are based on technology development requirements and engineering estimates for the design and construction of the treatment facilities. Shown on each of the treatment schedules are the primary milestones that will be reported and tracked as part of FFCA II.

The LLM Solvent Contaminated Waste Treatment System in Figure 5-1 bears additional explanation. Because thermal treatment of mixed waste is an option that may meet public resistance, a non-thermal treatment option will be pursued by DOE. However, the fastest path to achieve compliance through treatment of these wastes appears to be thermal treatment, with the Fluid Bed Unit (FBU) as the primary technology treatment system. While non-thermal treatment is an attractive alternative, the technologies that comprise the non-thermal option are less mature than thermal treatment technologies and cannot constitute the baseline plan for treatment of solvent bearing waste forms.

The technologies identified in this plan are recommended as the baseline technologies based on limited information, but provide a target for an integrated system to be successfully implemented. However, new technologies may become available that could lead to faster or better compliance through treatment. Regulatory changes, changes in the mission, or changes in the assumptions in this plan could alter the pathway to compliance.

Figure 5-2 shows the generic flow and time frame for two major activities: waste characterization and waste treatment development, and the major dependency of the latter on the former. However, chemical analysis of the actual radioactive-mixed wastes must be performed prior to demonstrating the treatment process (Demo Hot in Figure 5-2) on waste. But, both characterization technology and early development of treatment technology will occur simultaneously as show in the figure.

Figure 5-1 Implementation Plan And Applicable Waste Forms

	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
LLM Solvent Contaminated Wastes Treatment System																													
Thermal																													
Non-thermal																													
Absorbed Organics																													
Analytical Lab Solutions																													
Cemented Composite Chips																													
Combustibles																													
Cutoff Sludge																													
Cyanide																													
ECM Sludge																													
Excess Chemicals																													
Filters																													
Fluid Bed Incinerator Oils																													
Insulation																													
Misc Organic Liquids																													
Organics, Discard Levels																													
Paints																													
Particulate Sludge																													
PCB Liquid																													
PCB Solid																													
Roaster Oxide																													
Soil & Cleanup Debris																													
Solidified Organics																													
Solidified Process Solids																													
Turnings																													
Used (Spent) Turnings																													
LLM Solar Pond Cleanout Treatment System																													
Salicrete																													
Pondcrete																													
Pond Water																													

These waste streams will be processed by one of the two processes above.

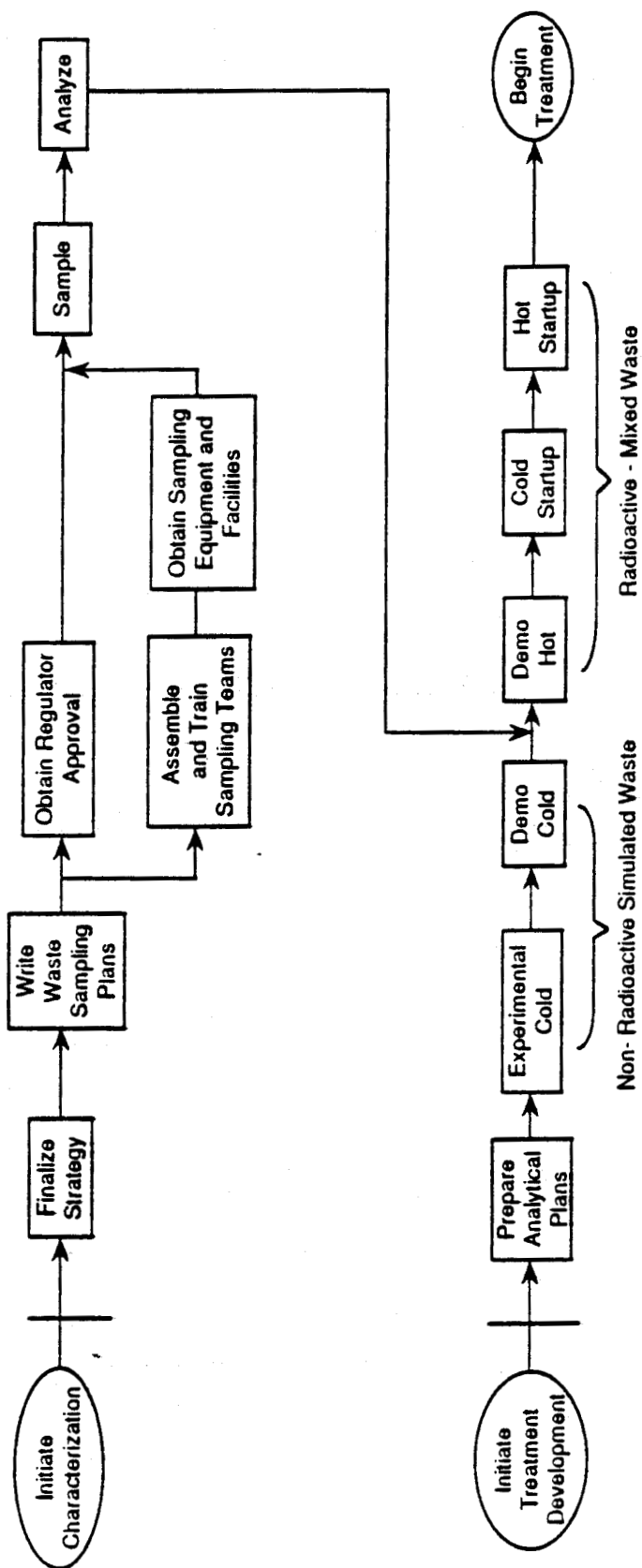
Sys Ops Tsling

These waste streams will be processed by the above system.

Figure 5-1.2 Implementation Plan And Applicable Waste Forms (continued)

	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
LLM Solidified Bypass Sludge Treatment System	<div><div>TSE & R&D Permit</div><div>Part B Permit</div><div>Sys Ops Tsling & Issue Waste Process Sched</div><div>2023 Ops Compl</div></div>																												
Bypass Sludge	This waste streams will be processed by the above system.																												
LLM Miscellaneous Waste Forms Treatment System	<div><div>TSE</div><div>R&D Permit</div><div>Part B Permit</div><div>Sys Ops Tsling</div><div>Issue Waste Process Sched</div></div>																												
Acid Beryllium Fines FBI Ash Ground Glass Button Breakouts Sand	These waste streams will be processed by the above system.																												
Silver Nitrate																													
LLM Building 374/774 Treatment System	<div><div>TSE</div><div>R&D Permit</div><div>TSE</div><div>Part B Permit</div><div>Sys Ops Tsling</div></div>																												
Nitrate Salts Bypass Sludge	These waste streams will be processed by the above process.																												
LLM Surface Organics Removal & Bulk Lead Treatment System	<div><div>TSE & R&D Permit</div><div>R&D Permit</div><div>Part B Permit</div><div>2021 Sys Ops Tsling</div><div>2022 Issue Waste Process Sched</div><div>2027 Ops Compl</div></div>																												
Glass Lead Metal	These waste streams will be processed by the above system.																												
LLM Leaded Gloves Treatment System	<div><div>TSE</div><div>R&D Permit & Part B Permit</div><div>Sys Ops Tsling</div><div>Issue Waste Process Sched</div></div>																												
Leaded Gloves Leaded Gloves (Acid Contaminated)	These waste streams will be processed by the above system.																												

Figure 5-2
Generic Waste Characterization
Flow Diagram



6. SCOPE OF CTMP

This CTMP technology plan requires a long term commitment that can only result from a consistent vision of the plan's effect on achieving compliance. That vision is shown in Figure 6-1 for the types of waste currently generated at RFP.

As the mission at RFP changes, the types of waste generated will also change. Figure 6-2 illustrates some estimated LDR mixed waste volumes that may result from the RFP change in focus. The time phased approach to solving the LDR mixed waste problem currently at RFP must be managed so that future waste storage problems are avoided. The time phased approach accommodates the RFP changing mission while providing waste treatment capability for that changing mission.

The scope of the CTMP not only includes the LDR waste inventory backlog now stored at RFP and future generation of LDR waste, but also includes wastes generated from environmental restoration activities, secondary waste streams from residue elimination, and future decontamination and decommissioning (D&D) activities.

The environmental restoration activities involve the cleanup of wastes at individual hazardous substance sites at RFP. These remedial activities, related construction and support work will generate additional secondary LDR waste streams that must be managed as part of the CTMP.

Weapons production at the RFP has generated vast amounts of residues which are addressed in the *Mixed Residue Reduction Report*. Processing of the residues by actinide separation will produce LDR wastes that are part of the CTMP.

In addition, specific plans and schedules are being developed for D&D activities of buildings, equipment, and pipes, and tanks in specific facilities at RFP. Once initiated, these activities will generate a large volume of LDR wastes requiring characterization and treatment. Capabilities and capacity for this characterization and treatment must be considered as part of the CTMP. Accurate estimates of future wastes generated by D&D activities will be necessary to allow effective integration into the planned approach and treatment facilities of CTMP.

The actions required as part of the CTMP will be accomplished in accordance with the requirements of the applicable Federal and State laws and regulations. The CTMP is a requirement of FFCA II. Primary and secondary milestones are identified for the development and implementation of treatment or management technologies to achieve compliance with LDR requirements. Schedules in the CTMP for achieving compliance are based on current applicable laws and regulations. Provisions in FFCA II allow for changes in the scope and schedules of CTMP. Such changes might involve applicable laws and regulations, or changes in the technology requirements for processing LDR waste.

ROCKY FLATS PLANT

Figure 6-1. Time Frame For Achieving Compliance

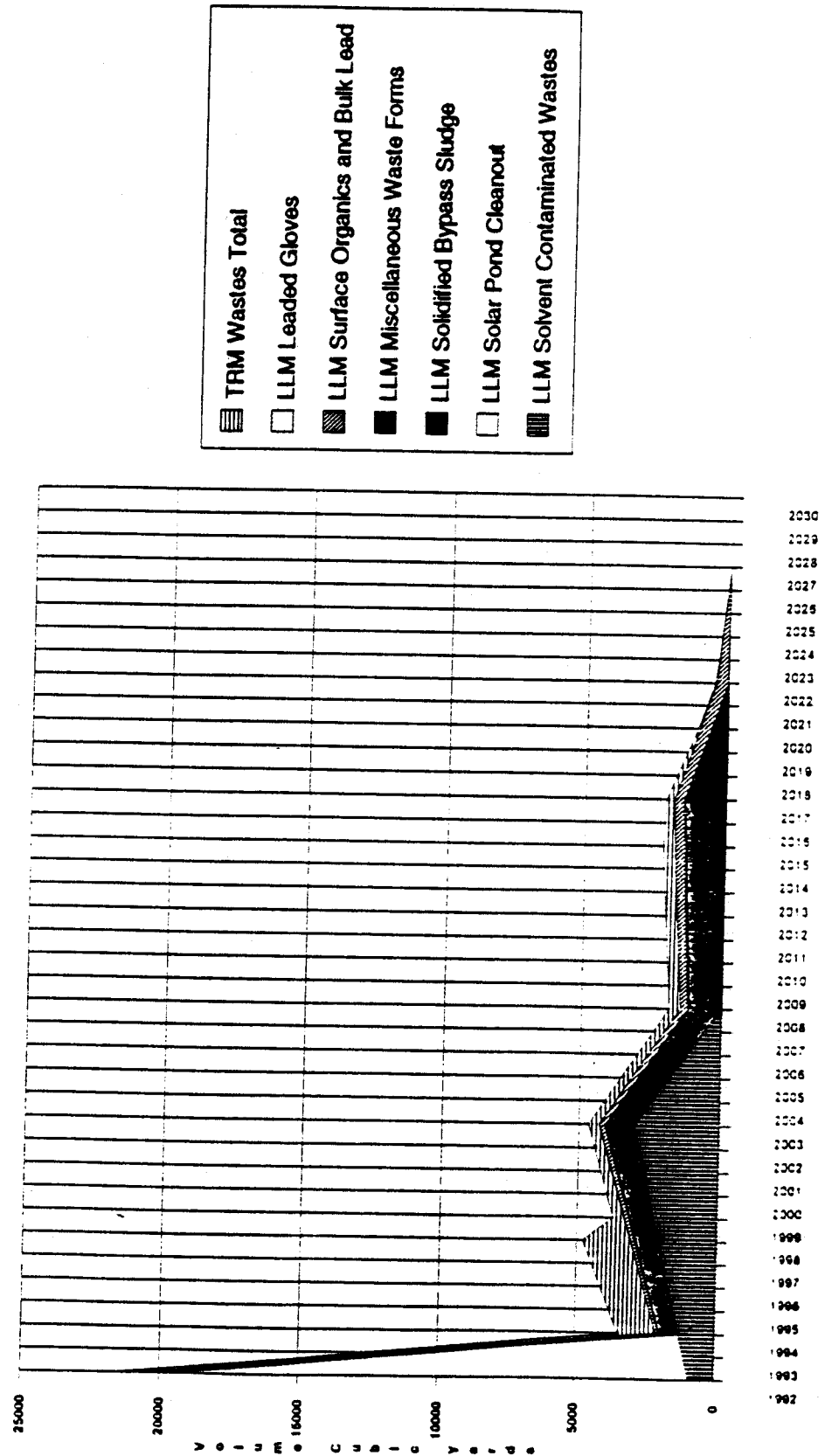
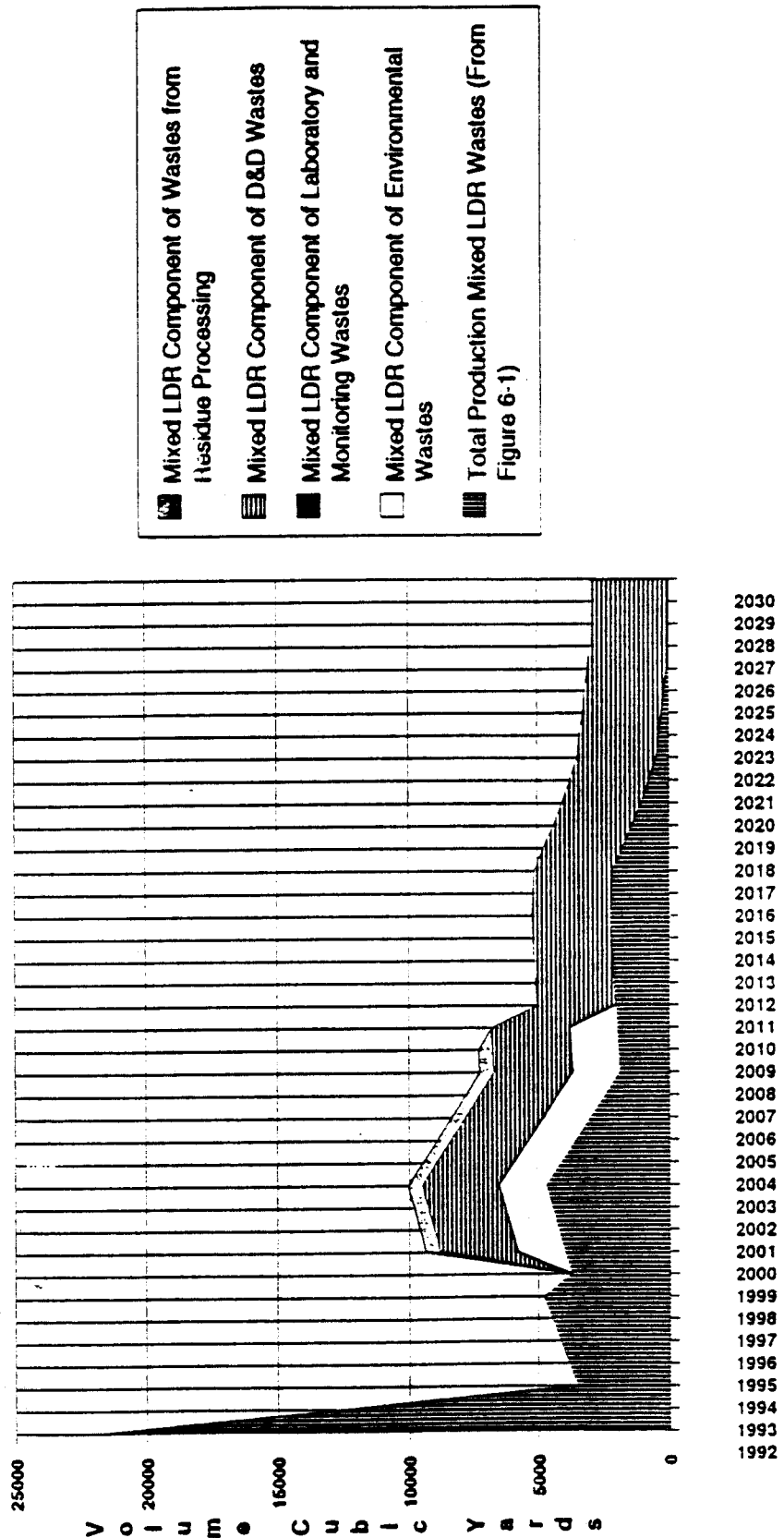


Figure 6-2. Estimated Future Generation And Treatment Of LDR Mixed Wastes



7. RESOURCES

Three resources are crucial for implementation of the plan. These are:

- Adequate analytical laboratory capability and capacity
- Appropriate space for developing and implementing treatment capability
- Storage capacity.

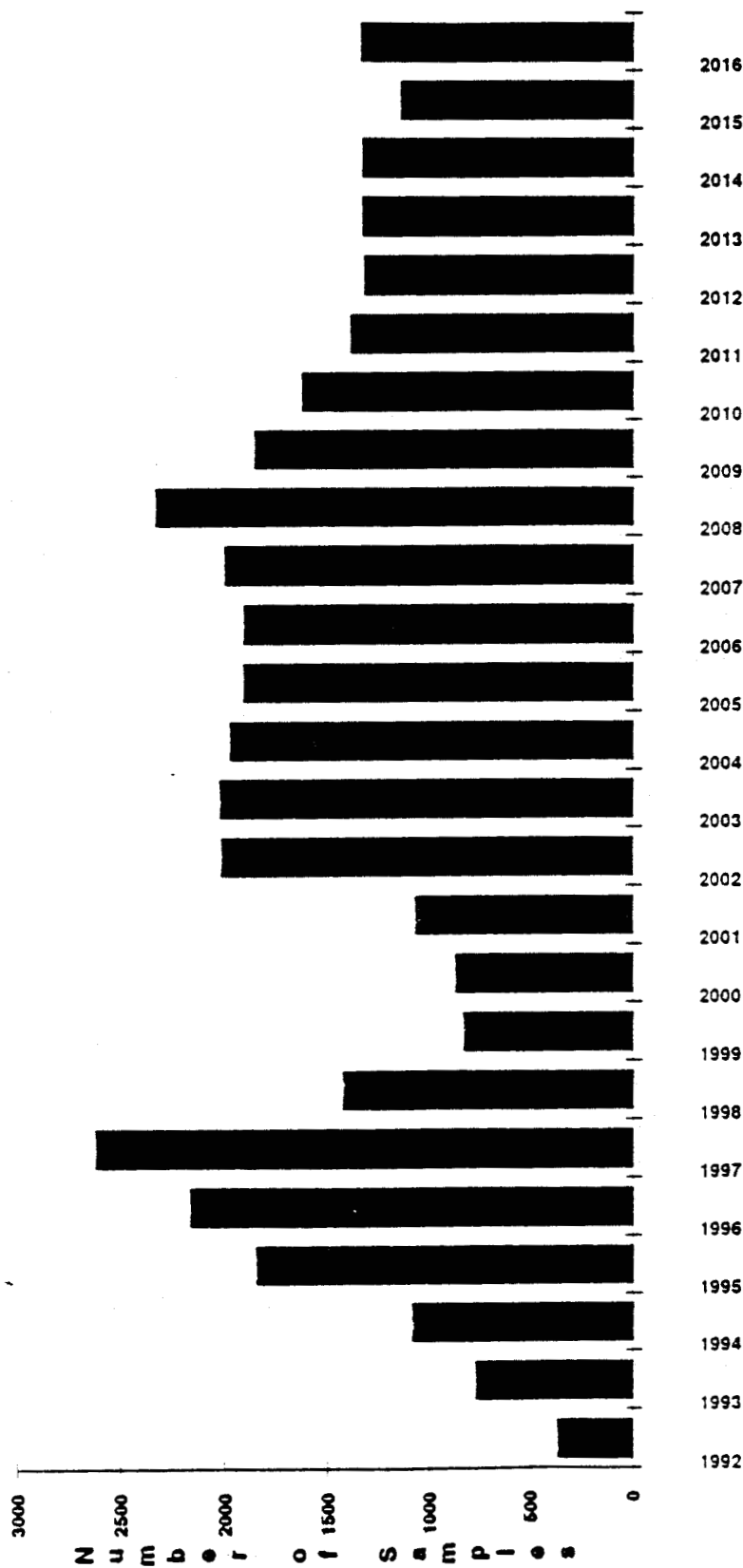
Figure 7-1 identifies the estimated samples that must receive analytical characterization for implementation of the plan. In order to meet EPA data quality objectives for many of these waste forms, substantial numbers of samples for each waste form will be required. To implement this plan, it is estimated that the average analytical characterization requirement will be in excess of 1000 samples/year. A total of 39,000 samples will be required during the life of the program.

This planned capability will also support residue compliance, D&D, and some environmental sampling and characterization needs. To enact this plan as soon as possible, the capability will need to be increased by a factor of about 4 to accommodate the competing programs. Even then, treatment production schedules will be impacted. This impact is still being defined.

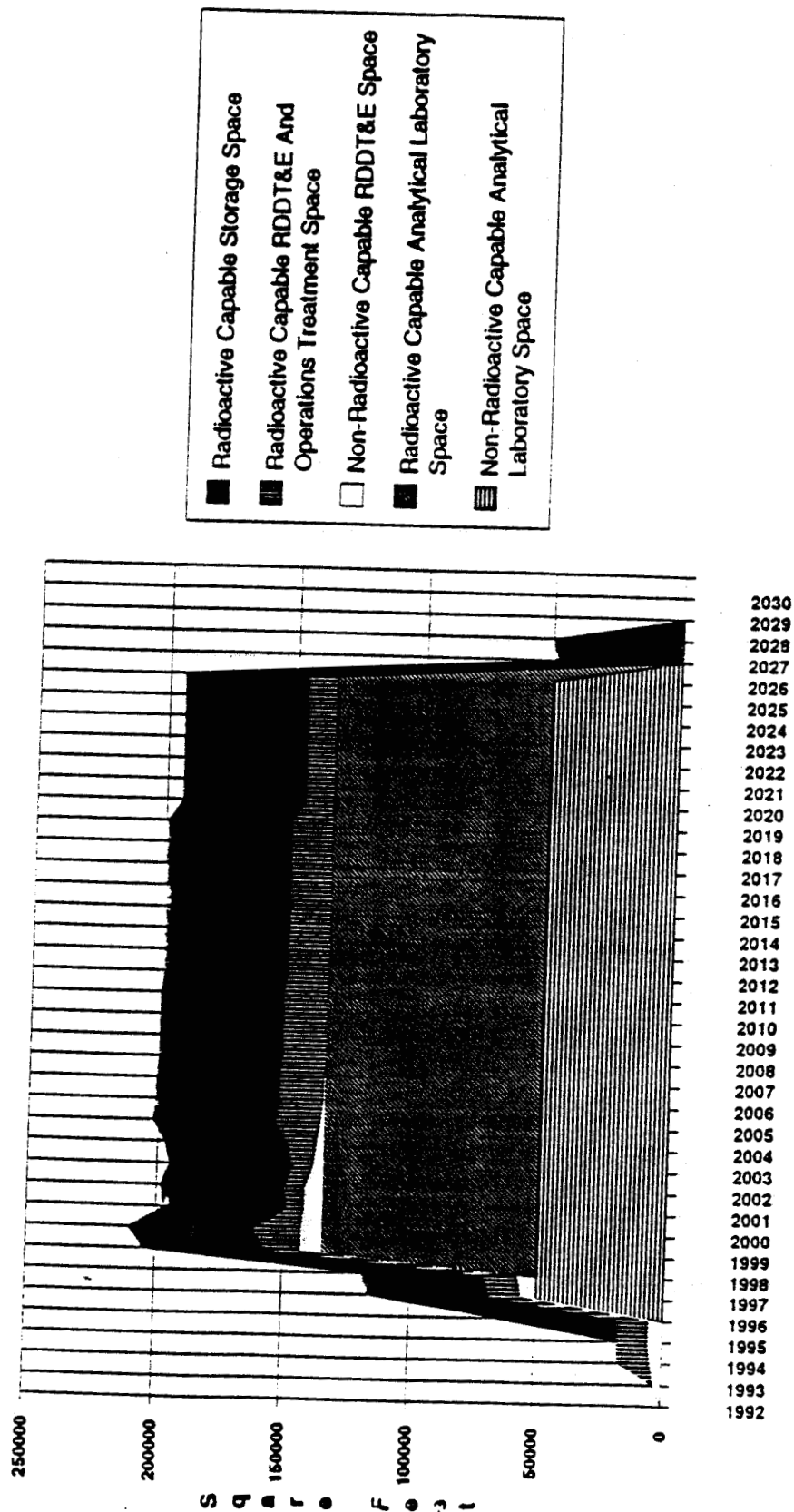
Appropriate space for all plans will be required. Figure 7-2 shows an estimate of the size and requirements for the needed space. The space will be made available by modifying existing RFP facilities.

ROCKY FLATS PLANT

Figure 7-1. Estimated Total Annual Analytical Laboratory Sample Throughput Required To Support CTMP



**Figure 7-2. Estimated Additional Space Requirements
And Utilization**



8. MANAGEMENT

In order to implement a CTMP that will result in full compliance with LDR wastes, it is necessary to develop and implement a strategy that will effectively lead to comprehensive characterization, treatment, and disposal of all identified classes of wastes within the framework of required regulatory, budget, and scheduling requirements. The management process will include:

- Comprehensive treatment of identified LDR wastes
- Management of technology development projects that support required CTMP treatment systems
- Identification, development and installation of required facilities for operating CTMP treatment systems
- Development of optional treatment technologies for waste categories where significant technical or regulatory risks exist
- Process for effective down-selecting of treatment technologies required to process specific LDR wastes
- Identification and development of required technology for waste characterization and analytical methods
- Design of required treatment systems for selected wastes
- Preparation of all permit applications and NEPA documentation for each treatment system
- Fabrication, testing and validation of each treatment system
- Ultimate disposition of all identified LDR waste forms to achieve full RCRA compliance.

A major function of the management of CTMP and the accomplishment of tasks identified in this plan are to ensure that all external and internal interfaces are established, and that the requirements for CTMP are integrated with other waste management programs at RFP. Future generation of other LDR wastes from environmental remediation, residue and D&D activities will be integrated into the plan, and waste characterization and treatment facilities will be expanded to handle these additional requirements.

A transition team has been appointed at RFP to develop a Transition Management Plan. The purpose of this plan is to define the management and business structure required to support the transition of RFP facilities from their production mission to the new missions of the plant. Activities in support of CTMP implementation will require a major part of the new resources that will be provided through this plan, and will be integrated with other identified missions of RFP. As part of the RFP Transition Management Plan, activities in support of the CTMP will be identified. Schedules to achieve full RCRA compliance with LDR wastes that exist at RFP will be coordinated with schedules specified in the CTMP.